



key features

Compact and Flexible

48VDC and 24VDC system designs. Constant power capability delivers more recharge current to minimize recovery time. Zero clearance required above or below the Powershelves.

Rugged Design

Rated for continuous operation from -40°C to +70°C, over a wide AC Input range 85-300VAC. Tolerates loss of neutral by withstanding 440VAC indefinitely.

Highly Integrated

Controller, Rectifiers and Battery Management and Distribution provided in a compact space.

“Hot-Swap” and “Plug & Play”

Even the Controller! For quick and easy service of modules.

Extensive Battery Management

Includes capacity and optional cell level monitoring, reserve time estimation, battery temperature compensation and controlled current discharge testing.

System Event Management

Alarm and Event Logging. Five User Programmable alarm relays.

Easy Powershelf Installation

Turn key solution. Integral reverse battery polarity protection.

Easy-To-Use Remote Management System

Connections via TCP/IP, USB, RS-232 or RS-485 with HTTP and SNMP interface capability. Automatic system time synchronization capability, email and SMS service notification.

overview

The RT9 Powershelves are a range of high power density turn-key DC power solutions providing modular power, distribution, monitoring and control.

Covering both 48VDC and 24VDC, the RT9 Powershelves are highly integrated including battery distribution, battery current limiting, battery temperature sensing, low voltage disconnection, short-circuit and reverse polarity protection (AC distribution modules are available for integration in the shelves).

The systems can be mounted in open-racks or enclosed 19" racks of 400mm depth or greater and are controlled by the MiniCSU-3 controller allowing web-based connectivity, user programmable alarm relays, battery management and hot-swap replacement capability.

applications

- Data & Wireless Networks and Switching
- Point of Presence (POP)
- XDSL and Other Broadband Applications
- Especially suited to Outdoor Enclosures

description

Power Shelves



The **RT9 Powershelves** are 19" rack mount units and are available in 2U, 3U, 4U and 6U high solutions. In each 1U rack space, up to two rectifier modules can be mounted side by side.

The Powershelves provide front to rear ventilation, with zero clearance required above and below the units, maximizing capacity for revenue generating equipment. The power shelves operate over a wide AC input of 85-300VAC and are equipped with user DIN rail terminations at the rear, configurable for single or three-phase. A 1U shelf can be configured as AC distribution for up to 8 rectifiers. Copper termination bars with M6 holes are provided at the rear for DC load and battery connections. A user specified load distribution unit can be connected to the system at the load terminations provided.

Rectifier Module



The **RT9 48V/25A** and **RT9 24V/50A** are switched mode rectifier (SMR) modules that deliver up to 1.4kW of output power and up to 30A output current to 48V and up to 60A in 24V nominal systems.

The RT9 suits nominal AC supply voltages between 208VAC and 240VAC and will continue to operate down to 85VAC at reduced power. The RT9 will operate up to 300VAC and will not be damaged when exposed to overvoltage of up to 440VAC. The RT9 is internally protected against voltage transients.

The small dimensions of the RT9, with efficiencies greater than 90% at full load, allow high shelf power density. Each rectifier is cooled by inbuilt speed control fans, allowing operation at temperatures up to +70°C. Power output is internally regulated to prevent rectifier damage under abnormal environmental conditions.

System Management

The hot-pluggable **MiniCSU-3 controller** manages the Powershelf and provides local and remote user access to all the system parameters and alarms. The MiniCSU-3 coupled with the **WebCSU** interface option provides HTTP, SNMP, automatic system time synchronization capability and TCP/IP access for the **WinCSU-2** Windows® based remote monitoring and control software. The front panel includes a 2x16 character display, menu navigation keys and a USB port for local PC access.

The MiniCSU-3 digitally controls the system voltage, rectifier load sharing, battery management/monitoring, and is designed for fail-safe operation. All system parameters are backed up within the Powershelf, independent of the controller, to enable "hot-swap" replacement of the controller without reprogramming or loss of alarms history.

Other features include ambient and battery temperature sensing, five user programmable alarm relays, AC voltage monitoring and alarm and event logging.

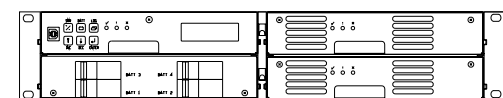
Battery Management

The integrated battery distribution module provides battery current monitoring, up to 4 circuit breakers, circuit breaker trip detection, a low voltage disconnect switch (LVDS) and reverse battery polarity protection circuitry. These features coupled with the enhanced battery management function of the MiniCSU-3 provide battery charge current limiting, adjustable charging schemes, controlled current discharge testing, battery temperature compensation and voltage monitoring of cell or monoblock strings.

Batteries

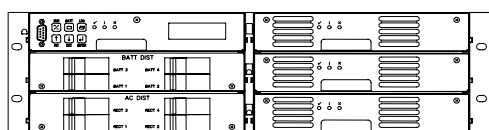
A wide range of batteries including flooded, VRLA, Lithium-Ion Polymer and Nickel-Cadmium technologies can be used with the RT9 Powershelves and may be sized to suit required reserve times and loads.

standard system configurations



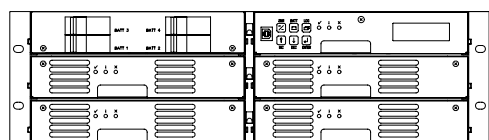
PSLF-1100 (48V)

PSLF-1102 (24V)



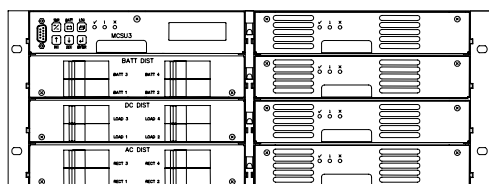
PSLF-1110 (48V)

PSLF-1112 (24V)



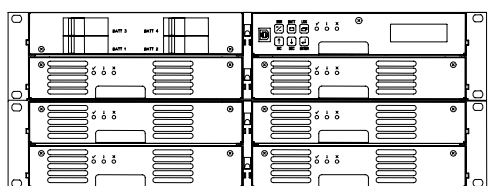
PSLF-1115 (48V)

PSLF-1117 (24V)



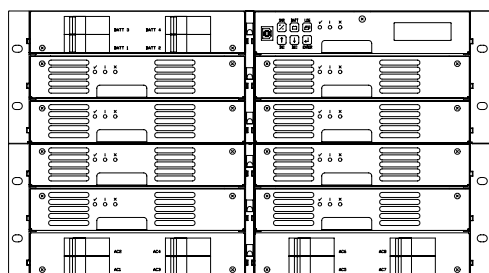
PSLF-1120 (48V)

PSLF-1122 (24V)



PSLF-1125 (48V)

PSLF-1127 (24V)



PSLF-1130 (48V)

PSLF-1132 (24V)

Power	Height	Weight	Recommended Load*		Max. Output		Battery Strings	AC MCB
			48V	24V	48V	24V		
2.8kW	2U	9kg	25A	50A	60A	120A	1	External
4.2kW	3U	13kg	50A	100A	90A	180A	1	3
5.6kW	3U	14kg	63A	130A	120A	240A	2	External
5.6kW	4U	17kg	63A	130A	120A	240A	2	4
8.4kW	4U	19kg	100A	200A	180A	360A	2	External
11.2kW	6U	26kg	150A	300A	240A	480A	4	8

*The recommended load current is based on N+1 redundancy and uses the redundant rectifier to contribute to recharge current.

key features

Remote Monitoring and Control

Remote monitoring and control via modem (standard or PPP), RS-232, RS-485 or Ethernet.

Remote SNMP

SNMP option for interfacing to Network Management System.

"Hot-Swap" Module

All system level parameters and logs are backed up on separate system-level, non-volatile storage. Controller can be replaced without the need for system reconfiguration.

Local Serviceability

High visibility front Organic LED Panel and menu navigation buttons for on-site service.

Local PC Access

USB front panel interface for local PC connection.

Flexible Alarms

Control of 5 user programmable alarm relay contacts.

Security

Password protection to limit access.

Event Logging

Alarm/Event log with date/time stamp.

Extensive Battery Management

With Battery monitoring (voltage, current, capacity, and temperature), controlled current discharge testing and recharging, battery temperature compensation, and optional cell level monitoring.



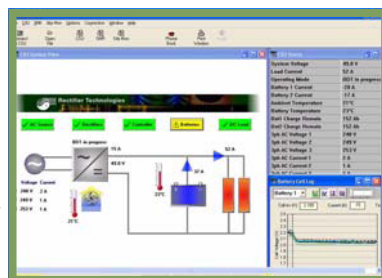
functions and features

System

- System voltage and total load current monitoring
- System voltage regulation and bus voltage drop compensation
- Real time clock with Supercap backup (no battery to maintain)
- Load fuse/CB failure detection

User/ Local Communications Interfaces

- Two-line, 16 character organic LED display with sleep mode screen saver
- Menu navigation buttons and 3 status LEDs for on-site users
- Local front panel USB port
- Controller firmware remote/local upgrade capability
- Alarm level settings and mapping to 5 user programmable alarm relays
- Alarm/Event log up to 100 events on local non-volatile memory



functions & features

Remote Communication Interface

- Embedded modem option (standard or PPP versions)
 - capable of dialling out to 3 phone numbers until connection is made to report alarms or daily reports
- Isolated RS-232 or RS-485 options for connection to central monitoring room
- TCP/IP option for ethernet connection
- WebCSU option for Ethernet, SNMP or HTTP connection

Note: All remote communications options operate with the WinCSU monitoring and control PC software. The WebCSU unit provides the additional Web-browser and Network Management System (NMS) capabilities.

Battery

- Battery current monitoring
- Battery & ambient temperature measurement
- Battery temperature compensated charging
- Current controlled battery charging (3 battery voltage regions)
- Battery equalisation/boost charging
- Battery capacity monitoring
- Battery fuse/CB failure detection
- Controlled current battery discharge testing (periodic or manual triggered)
- Control of low voltage battery / load disconnect

Rectifier

- Module alarm threshold programming
- Module remote firmware upgrade capability
- Module current monitoring
- Active current sharing correction (with fail-safe passive sharing default)
- Rectifier data retrieval - serial number, firmware version, internal temperature

available alarms

System

- Mains failure (detailed Alarms for AC voltage, current, frequency with optional AC monitor activated)
- No load
- Load fuse/CB failure
- High ambient temperature
- Temperature sensor failure
- Excess system bus voltage drop (system voltage clamp)

Battery

- Battery discharge
- High battery voltage
- Low battery voltage
- High temperature
- Low voltage battery/load disconnection
- Battery fuse/CB failure
- Differential battery discharge current
- Cell failure (with cell monitor option activated)

Rectifier

- Module failure
- Module communications failure
- Module current limit
- Module power limit
- Module thermal limit
- Module overvoltage protection

specifications

Input AC

Voltage	Universal AC: 85—300VAC (L-N, 1 ϕ , or 3 ϕ -star, 3 ϕ -delta [option]). Fully protected up to 440VAC (L-N)
Inrush Current	<9A RMS per rectifier
THD	Line Harmonics meet EN61000-3-2
Power Factor	>0.98 for >50% output power

Output DC

Voltage	-48VDC systems, adjustable range 42.0V to 59.5V +24VDC systems, adjustable range 21.0V to 30.0V
Current Limit	30A per 48V rectifier modules, 60A per 24V modules. Fully adjustable
Power Limit	1400W per rectifier module
Efficiency	>90% at 100% output power for 48VDC systems >88% at 100% output power for 24VDC systems
Regulation	$\pm 1\%$ or better over line, load and temperature
Noise	<1mV RMS Psophometrically weighted <32dBnC Voiceband <10mV RMS and <100mV peak to peak (10kHz—100Mhz)

Protection

Short Circuit	Can sustain short circuit at output terminals indefinitely
Reverse Battery Polarity	Internal fuse at output of SMR, integral battery circuit breakers and detection/disconnection circuitry
High Voltage Shutdown	Rectifier shuts down if output exceeds programmed overvoltage limit
Electrostatic Discharge (ESD)	IEC 61000-4-2 (Level 4: Air 15kV, Contact 8kV)
AC Surge	IEC 61000-4-4 (EFT), Level 4 IEC 61000-4-5 (Impulse), Level X: 6kV/3kA IEC 61000-4-12 (Ringwave), Level X: 6kV/3kA
RF Immunity	IEC 61000-4-3 (Radiated), Level 4 IEC 61000-4-6 (Conducted), Level 3
RF Emissions	CISPR 22 Class B, (Conducted & Radiated)

Environmental

Operating	-40°C to +70°C
Full Power	-40°C to +55°C
Derated Operation	50% power at +70°C
Storage/Transport	-40°C to +70°C
Humidity	0 to 100% relative humidity, condensing.
Acoustic Noise	<60dB (A Weighted)

Mechanical Dimensions

Width	483mm	(19")	
Depth	355mm	(14")	
Height*	88mm—352mm	(3.4"—13.6")	*depending on configuration

Agency Compliances

Safety	IEC60950, UL/CSA 60950
EMC	ETSI EN 300 386 V1.3.2 (2002-12)
Environmental	ETSI EN 300 019

Duvine Ltd
Sturmer Road
Haverhill
Suffolk
CB9 7UU, UK

Tel: +44(0) 1440 706777
Fax: +44(0) 1440 762810
Email: sales@duvine.co.uk

www.duvine.co.uk

Information subject to change without notice.

Detailed specification of rectifiers and controllers available at www.duvine.co.uk

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